Selected Applications Relevant to the Pacific and Alaska Regions

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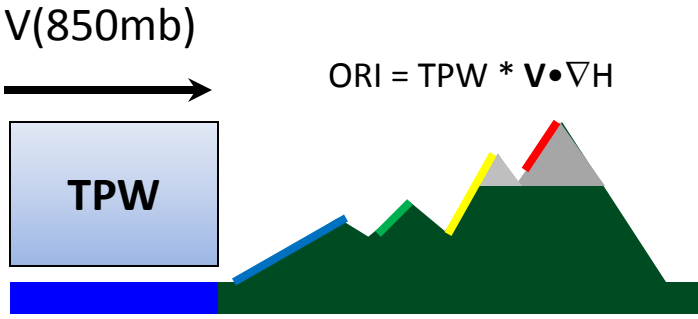
Cooperative Institute for Research in the Atmosphere

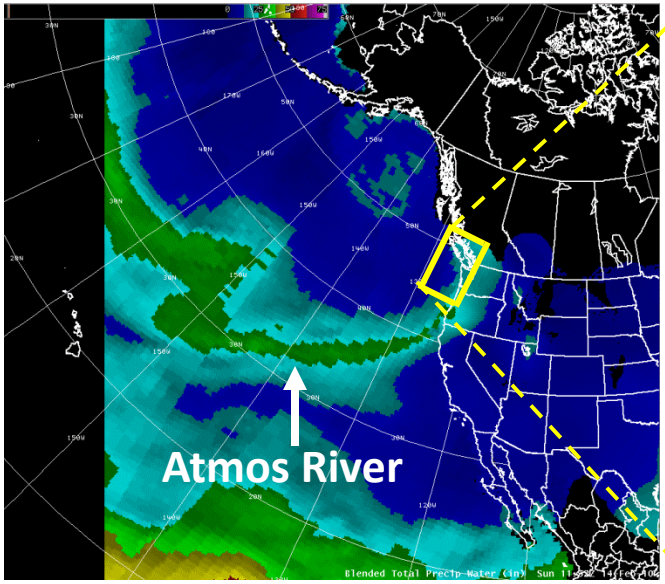
Orographic Rain Index (ORI) Short-Term Forecasting Tool

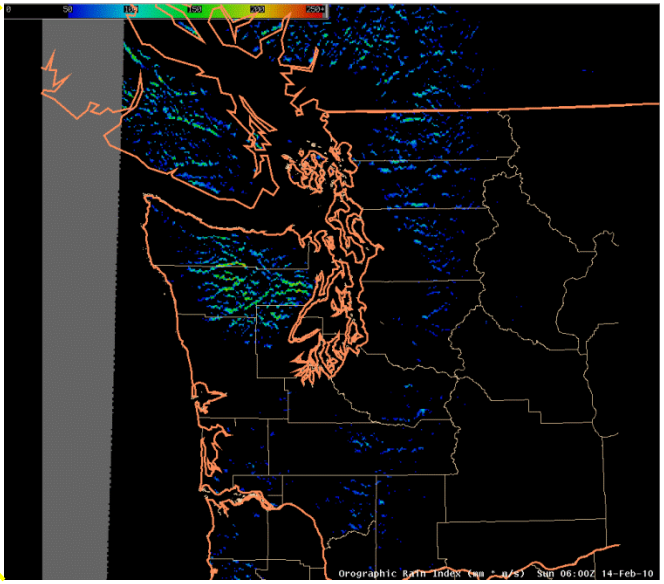
Satellite/Model Fusion Product:

1. TPW retrievals from GOES/AMSU/GPS
2. Model wind fields from GFS
3. High resolution (30 s) terrain database

→ Predicts where land-falling moisture plumes will interact with strong terrain gradients.

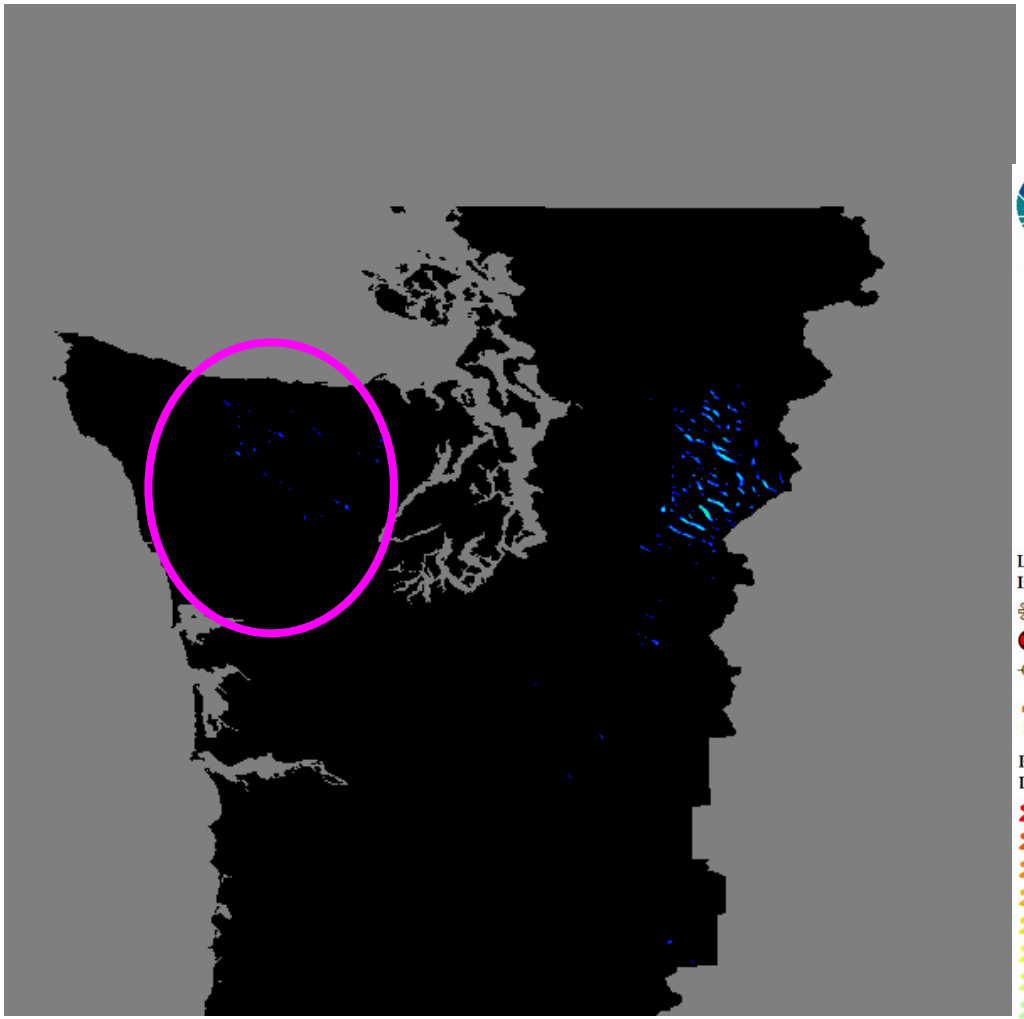




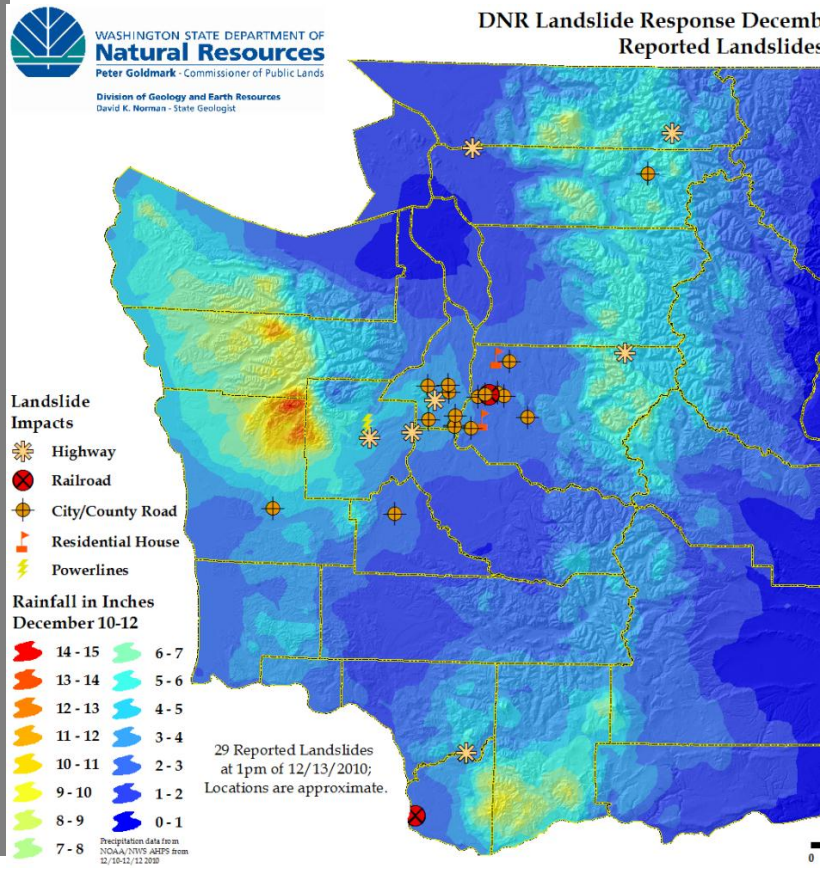


ORI: Pacific Northwest Example

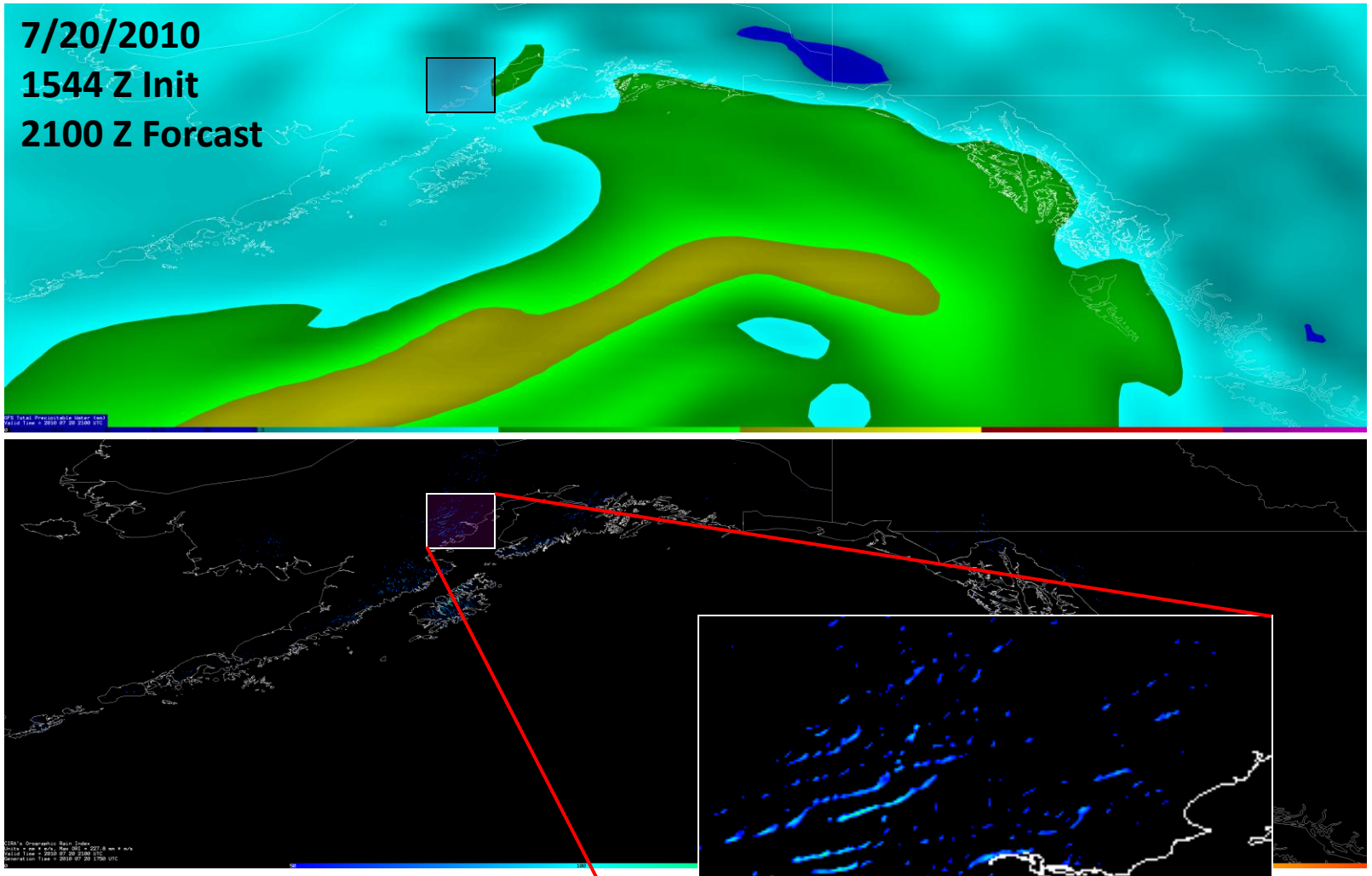
2010 12 10 09Z to 2010 12 13 09Z



Surface Validation

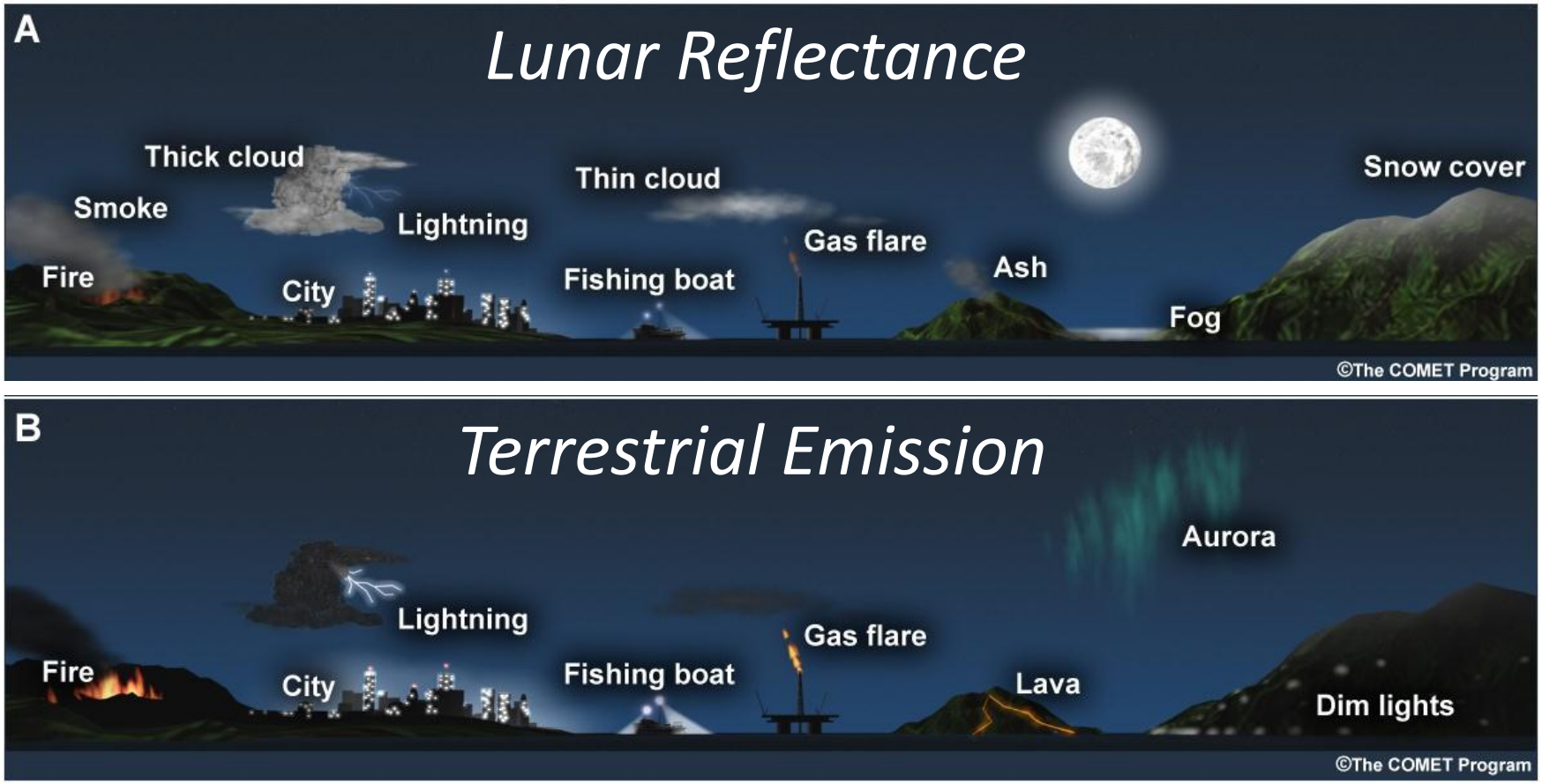


ORI: Alaska Example



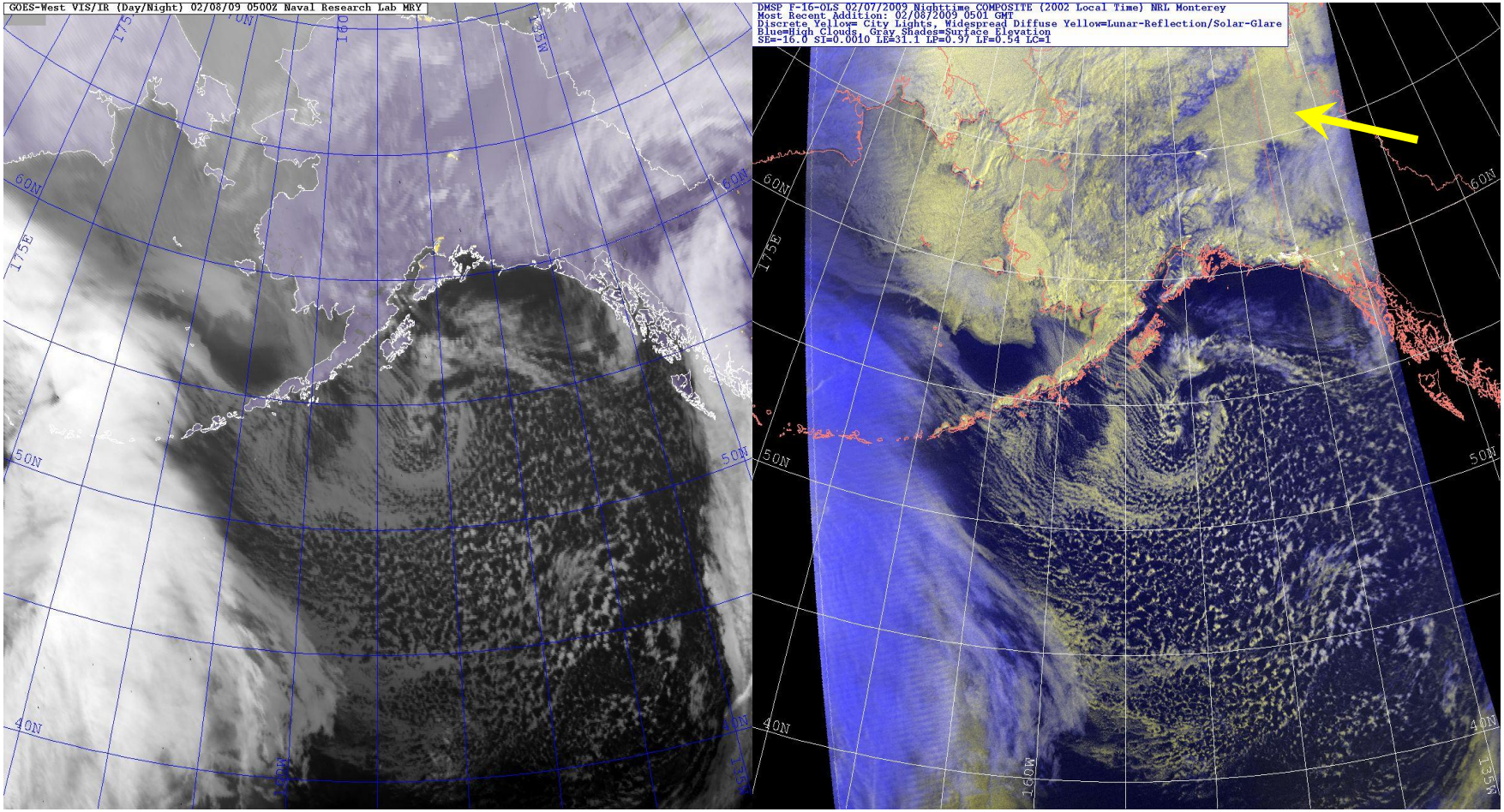
→ Slight errors in model analysis & forecast translate to potentially large ORI differences locally.

Nocturnal Light Sources



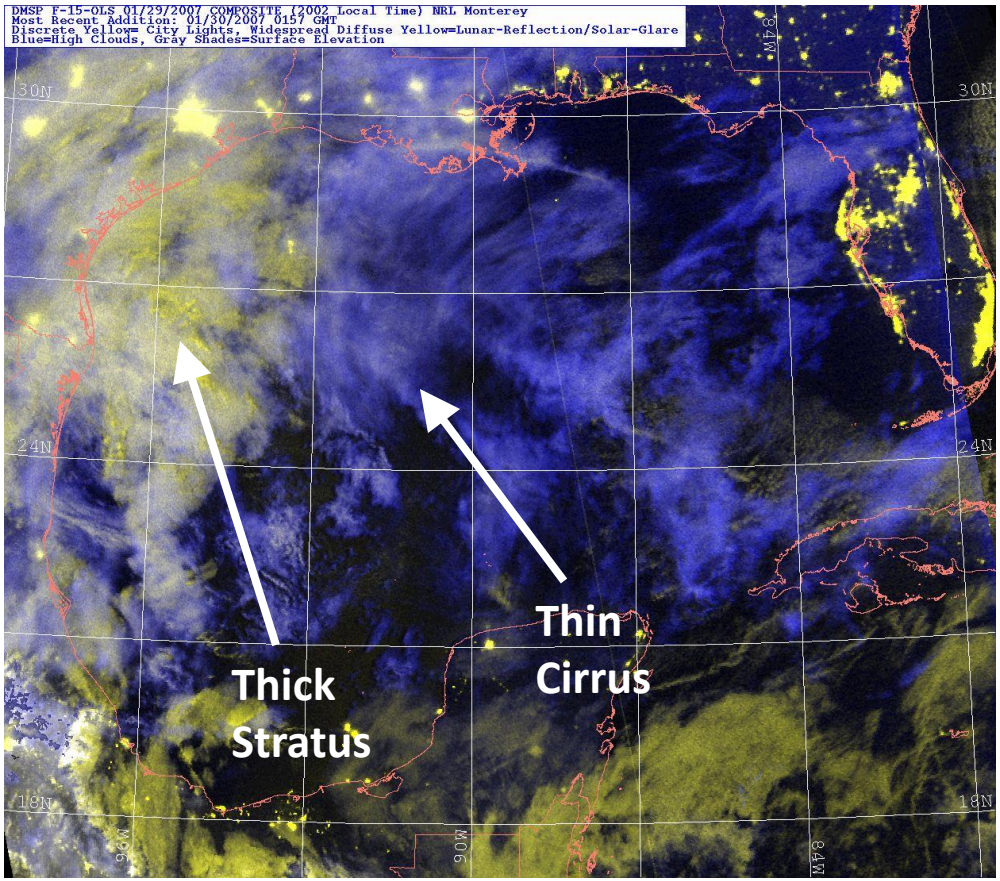
→ A comprehensive Satellite Proving Ground looks toward multi-sensor synergies—breaking down 'stovepipes' to optimize environmental characterization. The following examples illustrate examples of how the VIIRS/DNB can complement the ABI.

Low Clouds & Fog



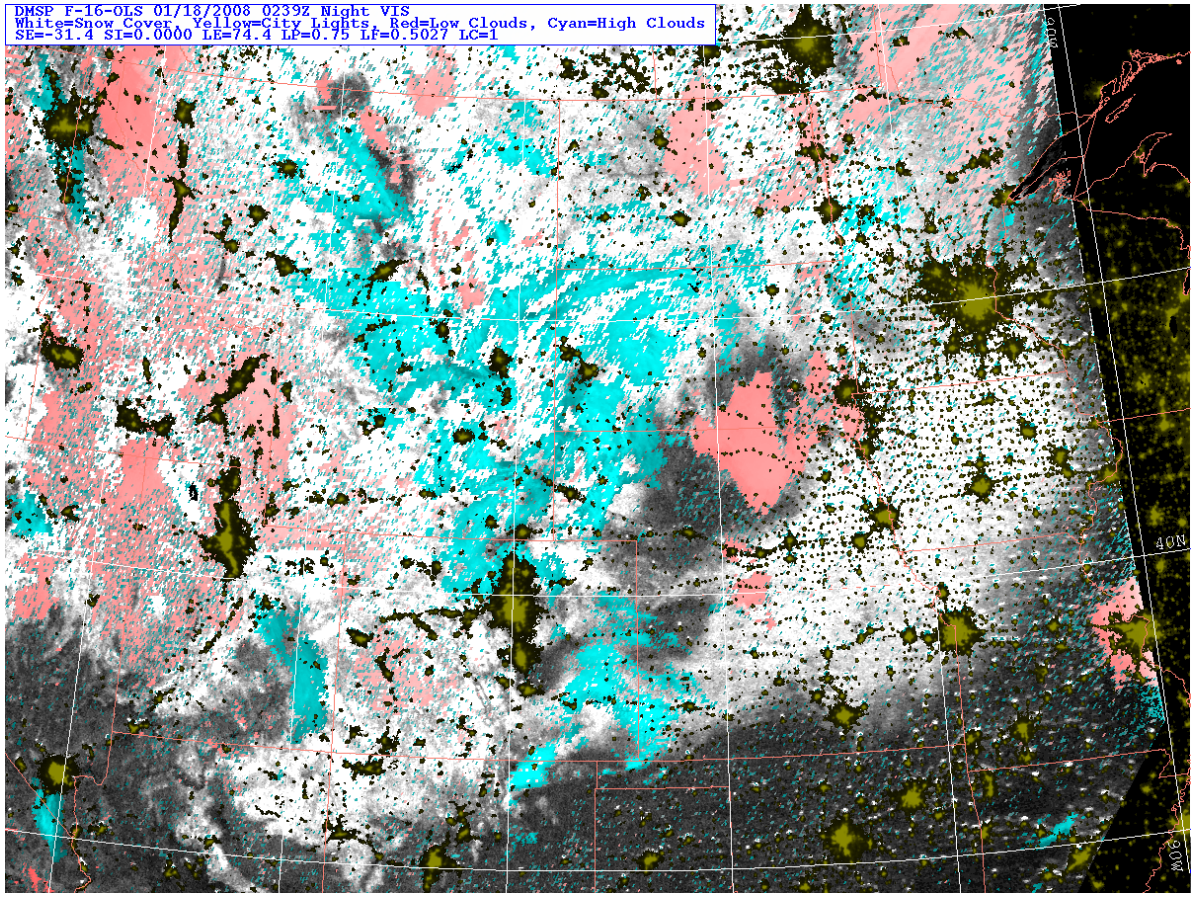
→ VIIRS/DNB will complement and augment the GOES-R ABI low cloud/fog detection at night in challenging conditions (e.g., cold land, cloud top microphysics, moist columns, overlapping thin cirrus, etc.)

Cloud Overlap



→ The VIIRS DNB will extend the GOES-R ABI capability for detecting thin cirrus overlapping low cloud decks (Pavolonis and Heidinger, 2004) to the nighttime hours.

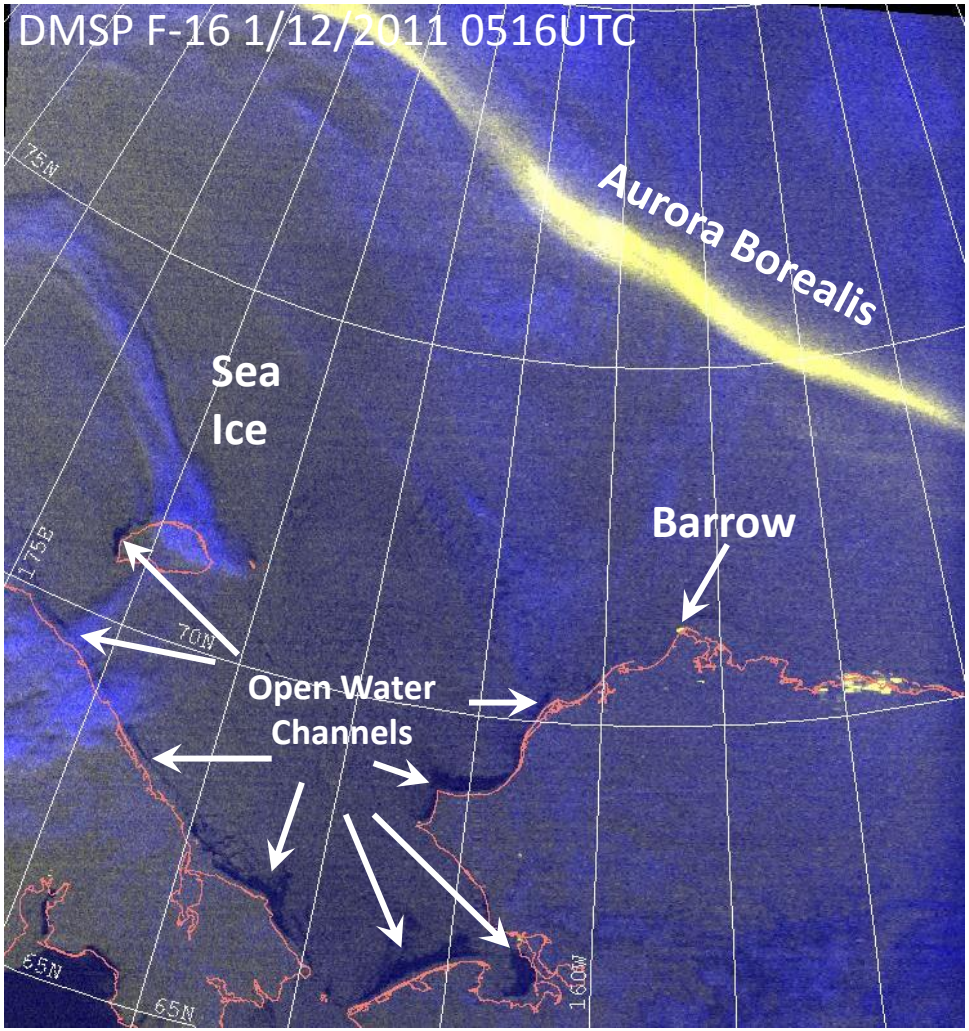
Snow Fields (via Multi-Spectral/Sensor)



Low Clouds	High Clouds	City Lights	Snow Cover

→ Being developed as a GOES-R/JPSS synergy product, with intermittent updates to snow field from DNB and cloud evolution (e.g., radiation fog) evolution from ABI.

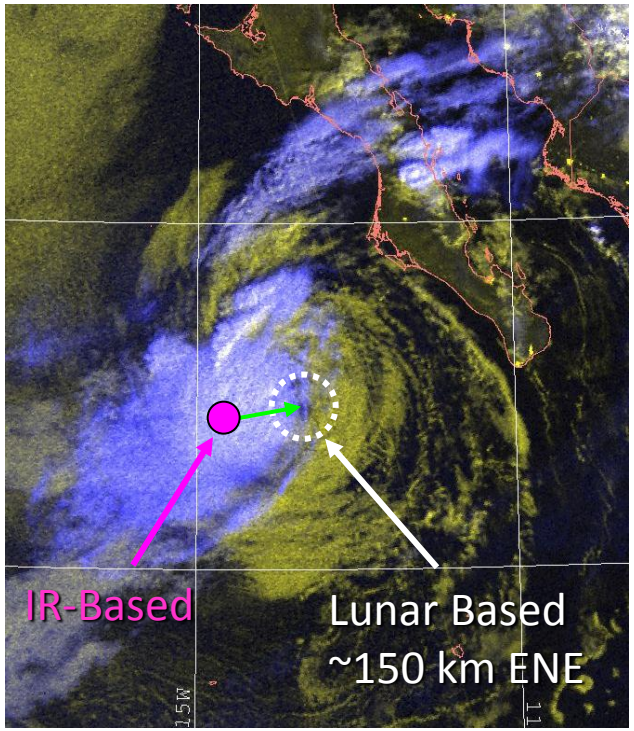
Sea Ice / Open Waters

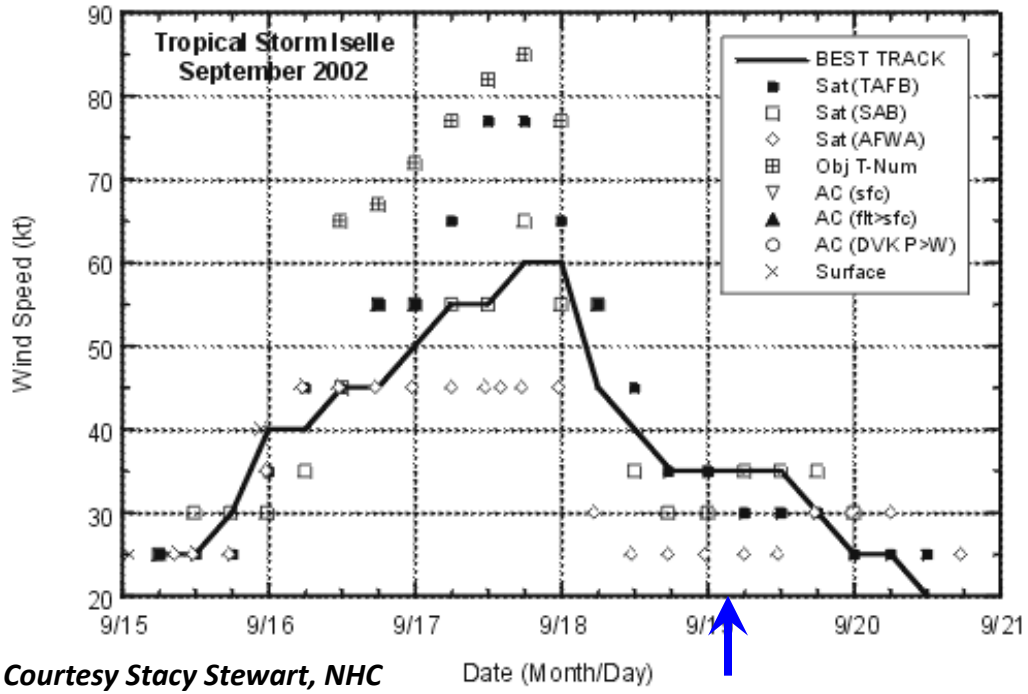


→ Nocturnal detection at spatial resolution (740m) that far exceeds the capabilities of passive microwave sensors traditionally used for sea ice detection—open water passages.

Tropical Cyclone Low-Level Circulation

Iselle (2002) EPAC



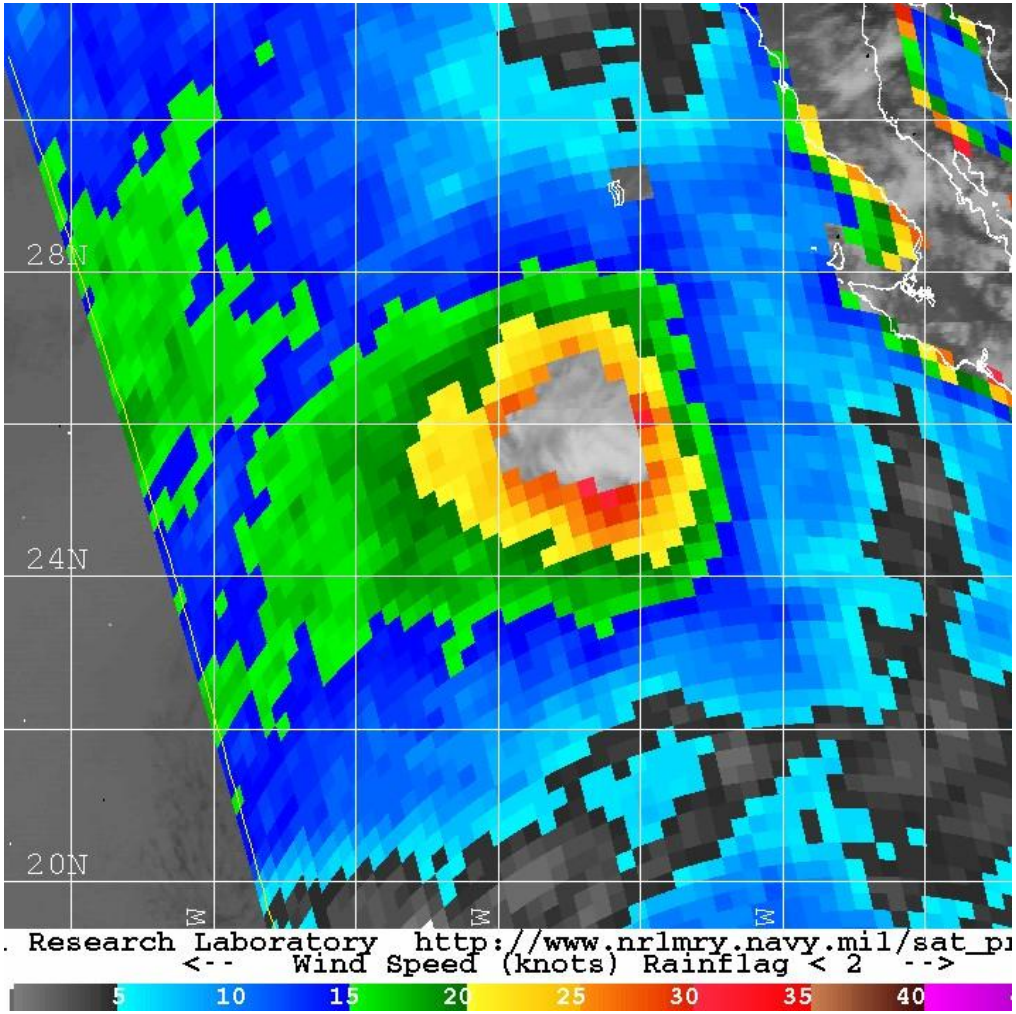


Courtesy Stacy Stewart, NHC

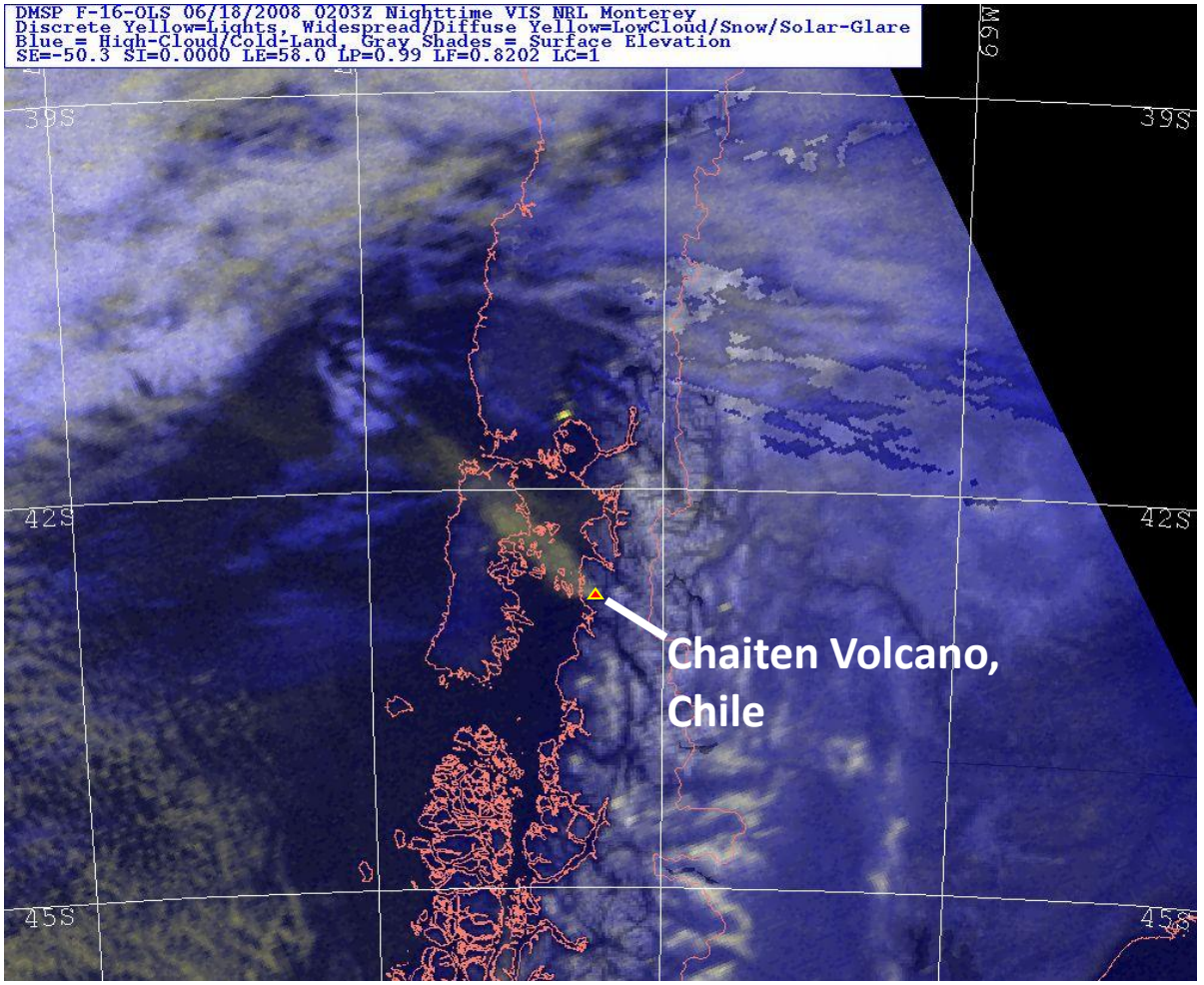
→ Convection is displaced west of the low-level circulation center, low level cloud structure difficult to detect with thermal bands (microphysics and atmos vapor). Sustained winds still > 30 knots.

Tropical Cyclone Low-Level Circulation

Flossie (2001) EPAC

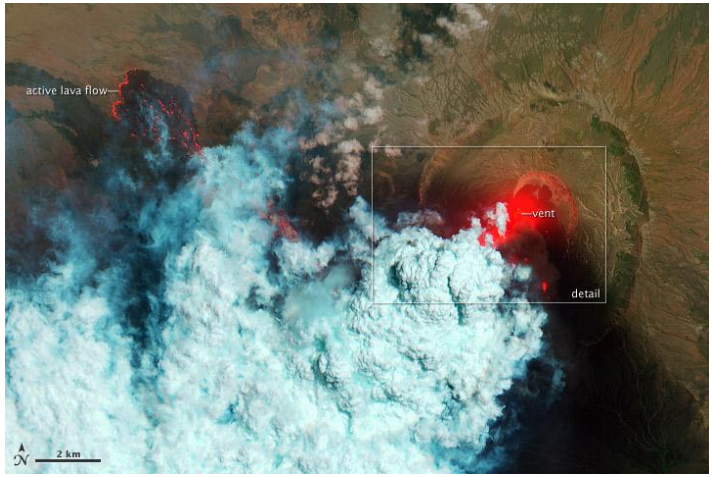


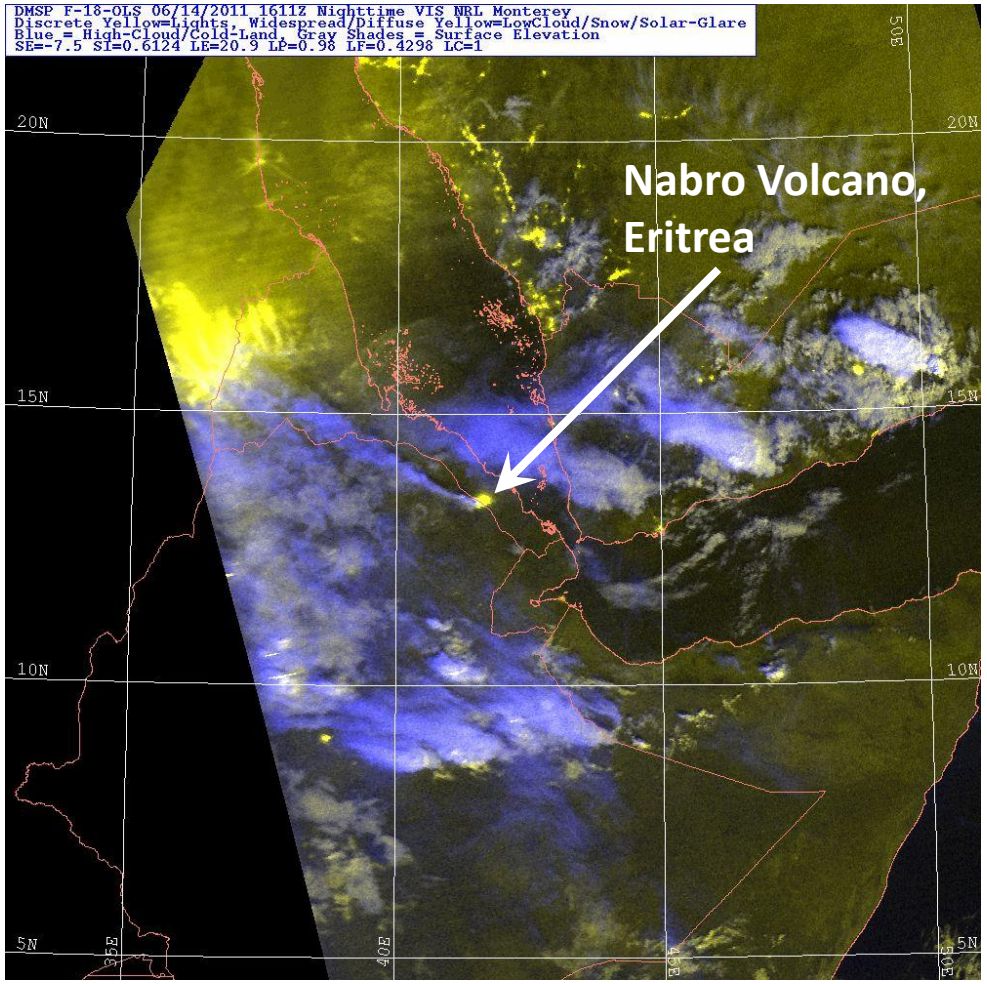
Volcanic Ash Plumes



→ Volcanic ash plumes chemical/optical properties highly variable globally—a "one size fits all" detection scheme is elusive. Nighttime visible data complements IR techniques for plume detection.

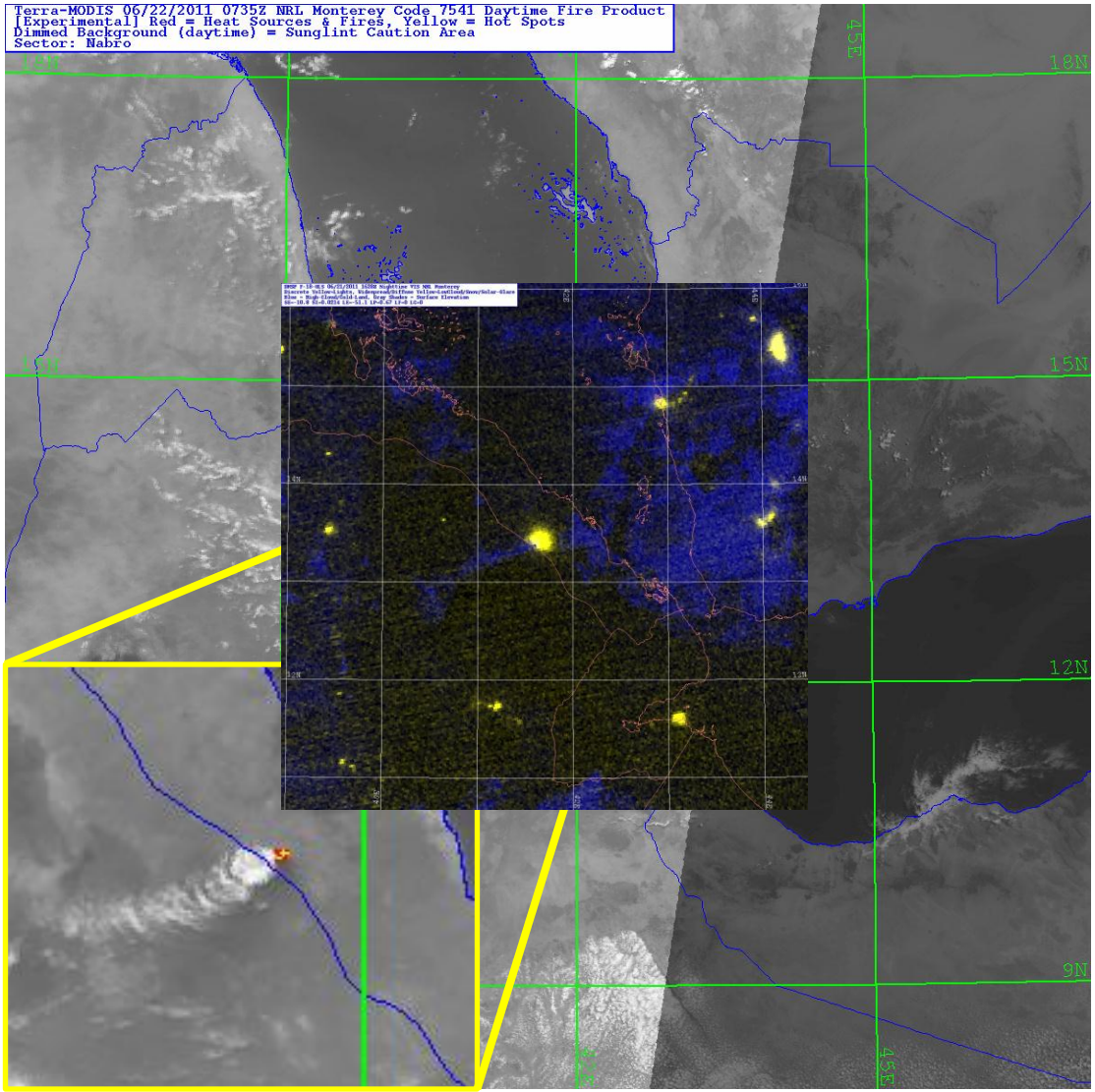
Light Emission from Lava Flows





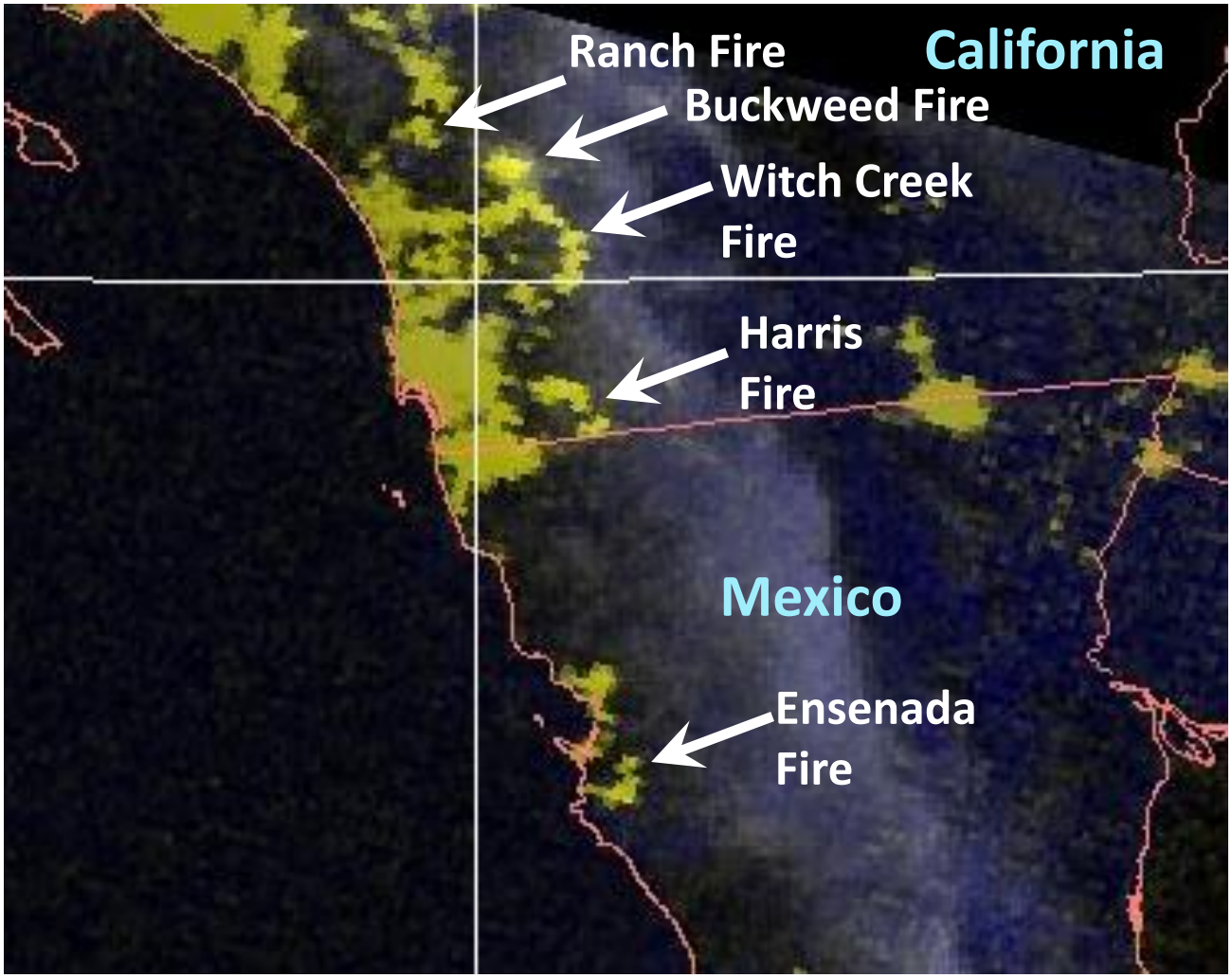
→ Anomalous light sources are readily identified via automated detection algorithms, using a static nighttime lights database.

Fire/Hot-Spot Detection



→ Heat signatures from the ABI SWIR bands will corroborate visible light emissions from lava flows (and lava-induced fires).

Active Wild Fires



→ The ABI will tell us where the hot spots are, and the DNB will tell us the fraction of those areas that are actively flaming vs. smoldering. (*Would IMET forecasters benefit from this additional info?*)